

REMARKS

Reconsideration and allowance of this application are respectfully requested in view of the above amendment and the discussions below.

Applicant's invention is a compound electrode arrangement which is used as a replacement for an anode and solution electrode and a catholyte and solution electrode. The compound electrode of the present invention has a solution electrode inside of an anode or catholyte electrode with a liquid, gel or electrolytic membrane between the solution electrode and the anode/catholyte electrode. The outer electrode fully encloses the electrically conducting material. There is but a single outer conductor 14 in Figure 1 which is a continuous structure having an input 14.

Claims 1, 4, 6, 11 and 12 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, 16 and 19 of U.S. Patent No. 6,475,653. According to the statement of the rejection the claims are patentable distinct from each other because the claims of the '653 patent teach a compound (composite) electrode that has an inner electrical conductor and an outer electrical conductor with an electrically conductive material sandwiched there between .

Applicant respectfully traverses this rejection on the ground that independent claim 1 of the '653 patent concerns a fuel cell with a separate anode cell and a separate cathode cell with each of these cells having a central current collector and a catalyst coating. One end of the anode electrode and one end of the cathode electrode are connected to an electrical load outside of the fuel cell.

In contrast, independent claim 1 of the present application calls for a compound electrode wherein an inner electrical conductor electrode is contained and has one end enclosed by an outer electrical conductor electrode as shown, for example, in Figure 1. Furthermore an electrically conductive material is sandwiched and enclosed by the inner electrode and the outer electrode. There are numerous distinctions between claim 1 of U.S. Patent No. 6,475,653 and independent claim 1 of the present application and it is submitted that claim 1 of the present application is not an obvious variation of any of the claims and particularly not of claims 1, 3, 16 and 19 of the '653 patent. Claims 4, 6, 11 and 12 depend from and further limit independent claim 1 in the present application and are also not obvious variations of claims 1, 3, 16 and 19 of the '653 patent.

Claims 1, 4-6, 7, 11 and 12 have been rejected under 35 U.S.C. 102 as being anticipated by the reference to Gomez (WO 99/12220) as indicated at item 9 of the Office Action. Applicant respectfully traverses this rejection on the ground that Figure 2 and the discussion at page 11, lines 7 to 18, which has been used as the basis for the anticipation rejection, has no disclosure which anticipates independent claims 1 and 7. Figure 2 of Gomez '99/12220 has a "sandwich" construction of an electrode with two wires 8 extending to two separate layers 5 of the electrode, as shown in the referred to Figure 2. This structure is opened at the bottom and at the top. In contrast, the compound electrode of Figure 1 of Applicant's invention, as claimed in independent claims 1 and 7 has an enclosed structure where the inner electrode 4 and the electrical conductive material 6 are fully enclosed by the outer

electrode. Independent claims 1 and 7 specifically require an inner electrical conductor contained in an outer electrical conductor. In order to further clarify this claim structure, each of independent claims 1 and 7 has been amended to recite that the inner electrical conductor electrode has at least one end enclosed by the outer electrical conductor electrode, as is clearly evidenced by figures and the specification.

It is to be noted that the reference to Gomez '12220 corresponds to the above discussed U.S. Patent No. 6,475,653.

Claims 1, 4-6 and 9 have been rejected under 35 U.S.C. 102 as anticipated by Mazanec et al. U.S. Patent No. 5,693,221 for the reasons indicated at item 10 at pages 6 and 7 of the patent Office Action.

Applicant respectfully traverses this rejection on the ground that independent claim 1 and independent claim 9 provide structure which is not available from the reference to Mazanec et al. It is submitted that there is no compound contained electrode system as claimed in the present invention but instead there is a flow reaction electrode where one reactant is flowed outside the electrode and another is flowed through the central aperture 54 as shown in Figures 9 and 10 and discussed at column 17, lines 42 to 46. It is these two Figures and the accompanying discussion which have been used as the basis for the rejection of claims 1, 4-6 and 9. The electrode of Mazanec et al. is intended for high temperature gases and would not function in the environment of the present invention because the electrolyte would be able to reach the inner and outer surfaces of the electrode.

Therefore, Mazanec et al. does not disclose the claimed arrangement of the compound electrode of independent claims 1 and 9, as discussed above.

Claim 8 has been rejected under 35 U.S.C. 103 as being unpatentable over Gomez '12220 in view of Mekjean U.S. Patent No. 3,293,159 as indicated at item 12. Claim 8 defines a compound electrode structure similar to claims 1 and 7 as part of a unipolar activation cell with an anode cell and a cathode cell. There is nothing in the reference to Mekjean which could be added to the above discussed reference to Gomez to meet the claim language of independent claim 8 with respect to each of the anode electrodes and the cathode electrode as they relate to there particular respective compound structure.

Claim 10 has been rejected under 35 U.S.C. 103 as unpatentable over Mazanec et al. Applicant submits that claim 10 depends from and contains all of the limitations of independent claim 9 and that the distinctions between the claimed invention of independent claim 9 and the reference to Mazanec et al. are not obvious variations and that dependent claim 10 inherits these limitations, as it depends from claim 9.

Claims 2 and 3 have been rejected under 35 U.S.C. 103 as unpatentable over Gomez in view of Meyers et al. U.S. Patent No. 3,708,220.

Claims 2 and 3 depend from and contain all of the limitations of independent claim 1. The reference to Meyers et al., even accepting the statement of the Examiner for its showing, adds nothing toward meeting these claim limitations. In a similar manner claims 2 and 3 are rejected under 35 U.S.C. 103 as unpatentable

over Mazanec et al. in view of Meyer et al. Claims 2 and 3 depend from and contain all of the limitations of independent claim 1. Nothing in Meyers et al. details features of independent claim 1 which are absent from the reference to Mazanec et al.

The specification has been objected to with respect to the reference numbers 12 and 14 of page 7. In response to this objection, Applicant has amended page 7 to reverse the order of these numbers in order to overcome the objection.

Claim 11 has been objected to because of the informalities listed at item 2 of the Office Action. In response to this rejection Applicant has cancelled claims 11 and 12.

Claim 5 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite with respect to the term "high specific surface area".

Applicant respectfully traverses this rejection on the ground that the term "high specific surface area" is understood by those skilled in the art. It refers to the actual surface area per unit of planar area. That is, the high specific area of electrodes may be formed by etching the surface of the electrodes with strong acids or forming pyramids on the surface of the electrode by machining or cutting or by attaching conductive gauze on the surface of the electrode or by gluing fine conductive particles on the surface of the electrode. As an example, 40 μ diameter glassy carbon spheres can be attached to the surface of a glassy carbon electrode after applying a conductive glue and baking the electrode at high temperature in an atmosphere of pure nitrogen gas. The objective of increasing the specific area of the

electrode is to increase the reaction rate of the electric chemical reaction and the reduce the energy consumption by lowering the voltage carried out by the electrode chemical reaction.

Although a specific example has been given, those skilled in the art understand that there are other methods of providing this high specific reaction area and are familiar with the effect resulting from such methods.

Therefore in view of the distinguishing features between the claimed invention and the references and in view of the non obvious distinctions between the claims of the present application and the claims of U.S. Patent No. 6,475,653, Applicant respectfully requests that this application containing claims 1-10 be allowed and be passed to issue.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #056284.50645US).

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Respectfully submitted,


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